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研究課題名(和文) Integrated policy potentials and adaptive capacity building in small-scale fisheries communities

研究課題名(英文) Integrated policy potentials and adaptive capacity building in small-scale fisheries communities

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研究成果の概要(和文)：女性が資源管理を担う小規模漁業共同体の、適応能力を高める適応策の発展に向け、この研究では、7都道府県の海女を対象とし、そのインタビューによると、海洋温暖化と海洋環境の変化に関する海女の持つ生態学的知識は、科学的知識に一致するものである。海女により特定された11個の適応行動のうち、貴重な地域の特定・保護、有益な情報の特定は効果的であると見なされている。一方、過去の経験からの教訓、政策や管理に関する考慮、能力開発、モニタリング、自然環境への外的負荷の減少、災害対策管理は、効果が限定的であると見なされており、それゆえ、有効性を高めるために政府や専門家からのさらなる支援が求められている。

研究成果の学術的意義や社会的意義

Beyond the narrow focus of building adaptive capacities in fisheries, this study could contribute to building narratives of climate change to enhance climate literacy and encourage action in civil society, and in doing so facilitate and build adaptive capacities and community resilience initiatives.

研究成果の概要(英文)：Towards developing adaptation policies that enhance adaptive capacities of small-scale fisheries communities where women are resource managers, this research posits that increased understanding of fisher ecological knowledge (FEK) data sets could reduce climate-related risks and vulnerabilities, enhance resource management, thus contributing to more integrative holistic approaches to adaptation policy. Based on interviews with female ama divers in 7 prefectures, FEK sets regarding a warming ocean and changing marine environment are in line with conventional scientific knowledge (CSK). Identification of adaptation activities needs contributes to further understanding of context and place. Of the 11 adaptation activities identified by ama divers, 2 were perceived as effective, 7 as having limited effectiveness and thus in need of more government and expert support to increase efficacy, and 2 as currently non-existent but in need.

研究分野：環境政策・環境歴史学策

キーワード： ama free divers FEK resource management climate change adaptive capacity artisanal fisheries adaptive policy

様式 C - 19、F - 19 - 1、Z - 19、CK - 19 (共通)

1. 研究開始当初の背景

The warming of the climate system is no longer a future scenario for researchers and policy makers to ponder, but a living reality. The scientific evidence is unequivocal and if we turn our attention to the ocean which accounts for 70% of the Earth's surface and 90% of habitable space, it has absorbed 93% of the additional warming since mid-20thC and sequestered an estimated 30% of the anthropogenic CO₂. This warming of the climate system and its impacts on the ocean is a growing concern as experts predict that by 2050, the total global maximum catch potential for fisheries may decrease from current yields by 2.8 to 5.3% under the low emission scenario RCP 2.6 and even more under the high-emission scenario RCP8.5 by 7 to 12.1%. Not only are our oceans at risk, but so too are fisheries communities, particularly artisanal and small-scale fisheries – those whose very livelihoods are intricately tied to and dependent on the ocean and its resources.

As the scientific certainty about climate change and its adverse impacts increases, so has the call to action. For fisheries communities, the call has been for multi-dimensional efforts to build adaptive capacities so as to increase their resilience and thereby reduce vulnerabilities and foreseeable socio-economic and environmental costs. Towards this end, experts have identified context and place specific holistic approaches that are ecologically, socio-economically, and culturally relevant. Further, emphasis has been put on the need for diverse knowledge sets to inform the design and implementation of adaptive capacity policy responses, in addition to making concerted efforts towards mainstreaming gender into climate policy.

Japan is warming at a disconcerting rate. According to observation data of climate change published in March 2019 by the Japan Meteorological Agency, the annual average sea surface temperature (SST) for Japan for the past century has increased by +1.12°C. Ranging from a high of +1.7°C in the central part of the Japan Sea to +0.74°C in the Sanriku and eastern part of Kanto coastal waters of the Pacific Ocean, the Japan average SST is roughly double the global average rise of +.54°C. Shifts in fish distribution and migration behavior, specifically northward polar shift among Japanese Spanish mackerel, squid, and yellowtail have been observed, resulting in catch decreases in some waters, in addition to seaweed bed degradation, and reported catch decreases in abalone. Compounding current impacts marine resources in the seas around Japan, marine productivity in addition to marine biodiversity is projected to decline.

2. 研究の目的

This project builds on research commenced in 2002 to explore observations – both perceived and real – about climate change among farming and fishing communities in Japan (field sites included Okinawa, Fukuoka, Kyoto, Mie, Ishikawa, Niigata, Fukushima, Miyagi, Aomori and Hokkaido) and how they compared to the findings of the 3rd IPCC Assessment Report Working Group II on adaptation and vulnerabilities. This land-to-sea, farmer-fisher investigation gradually evolved into narrowing the focus to female *ama* divers, the target subject of this study. The reason for this narrowing was to explore in more depth two fields of research: fisher ecological knowledge (FEK) and women in fisheries.

FEK asserts that knowledge sets of fishers is a cumulative body of developed knowledge, is observational and experiential in nature and will involve multigenerational cultural transmission. FEK can complement conventional scientific knowledge (CSK) – in other words the knowledge gained from scientists, and has the potential to improve decision-making when integrated into the policy lifecycle. When considering the ecological, socio-economic, and cultural relevance needs in adaptation policy, FEK can be a useful tool-set in resource management, particularly management that encourages participative involvement of community members. Further, FEK can provide practical information that is place and context-specific, such as information related to species migration in a given area between habitats to spawn or feed, and/or providing insights and information related to connecting critical habitats within a given seascape.

At the UNFCCC COP23 in Bonn 2017, noting the need for sex-disaggregated data and gender analysis in climate policy the first Gender Action Plan (GAP) was adopted. Despite these global efforts towards gender inclusive climate policies, mainstreaming gender in climate policy is still an evolving area of research. As is the study of women in fisheries. In spite of the importance of gender analysis in natural resource management, studies linking gender and marine management are limited, a reflection that contributions of women to resource management and environmental-related policy are often overlooked. Limited gender-specific data on fishing activities and missing numbers for women is related to several factors, including national policy agendas which tend to look at large-scale, often male-dominated capture fisheries, thus marginalizing the small-scale fisheries in which women tend to be more active. Further, there is limited desegregation of fisheries data in food production and resource management-related policy, meaning that in the overall policy picture, women's participation and contributions are often not visible.

The broad research aim is to explore potential adaptation policies for artisanal and small-scale fishing communities through the collection of oral history data and field-based studies focusing on the environmental observations and experiences of female *ama* divers in Japan in order to gain a better understanding of the intersection between the dynamics of fisheries management and women in fisheries. More specifically, this research explores how women participate in fisheries activities and how they too can (and should) be considered part of the overall management structure as a way forward to developing strategies for coastal fishery adaptation that identifies the limitations, vulnerabilities and works to enhance the potentials, towards building coastal fisheries resilience.

This research projects builds on a 3-year (2012-15) research project of the female *ama* divers in Ishikawa prefecture. Towards filling in the gaps on place and context specific adaptation potentials and limitations in artisanal female fishers, by expanding the range and number of female *ama* diver communities in Japan this research maintains the same focus as the Ishikawa study and continues to asks the same questions asked in that study around management practices, resource use and conservation, adaptation and policy. Further, it was critical to maintain the same aims and questions as the overarching objective of this research is to collect data of FEK and women – specifically female *ama* divers in Japan, over a 20 year period to build a climate change adaptation portfolio where women fishers/harvesters who physically submerge themselves below the ocean surface to carry out the harvesting activities and FEK are central features. The main focus of research aims include the following: i) explore environmental and fishery policy and managerial tools (i.e. fishing practices, voluntary no-take zoning, stock replenishment activities) that will increase flexibility, adaptability and resilience in the face of climate change; ii) gain new perspectives on gender relevance and cultural identity when considering resource management approaches and integrative policy potentials; and iii) consider inter-linkages of culture, nature views, environmental awareness and resource management practices with climate change adaptation policies and biodiversity management policies in small-scale fisheries.

3 . 研究の方法

As mentioned above, this research builds on a 3-year (2012-15) research project exploring the FEK and role of women in fisheries through the female *ama* divers in Ishikawa prefecture. It employs an ethnographic approach to explore the FEK of female *ama* divers and data was collected using a mixture of structured, semi-structured interviews, and oral history. Prior informed consent was obtained from the fisher cooperatives, female *ama* community members and local government fishery offices. Following a 3-year scoping period, formal interviewing first commenced in Ishikawa during the summer harvesting season of 2012. Utilizing snowballing techniques both within a given *ama* diver community and from one community to another in different prefectures, interviews began with simple background questions, advancing to a 6-page questionnaire. The questionnaire asked about harvesting seasons, fishing gear, harvesting grounds, no-take zones (MPAs), resource management approaches, and seasonal observations. Due to limited results of the written questionnaire, a modified interview approach was applied to employ semi-structured interviews, triangulation and oral history methodology. Oral history helped facilitate a less formal structure, allowing the women to share ‘her stories’ of life as a fisher woman, with minimal interjections and probing by the researcher.

Further, semi-structured interviews in all 7 prefecture field sites (Nagasaki, Fukuoka, Mie, Fukui, Ishikawa, Mie and Iwate) and were better suited to the communication norms and culture of the female *ama* divers, thereby providing more accurate insight into their perceptions, ocean views and knowledge sets. Knowledge sets are built through oral transmission, experiential learning and/or observation. The less structured approach allowed for flexibility in the place, and style of interviews. Interviews were conducted throughout the changing seasons and were highly varied: in a study group meeting to interviews on the boat en route to fishing grounds, brief conversations while swimming in the ocean observing the *ama* divers, in *amago*, sitting on the beach, and other places that provided a more relaxed atmosphere for interviewees. In total 193 female *ama* divers were interviewed, over half at least 3 times. Interview results were translated into English and used as the basis of this qualitative study. Any mistakes in reporting are the sole responsibility of this researcher.

4 . 研究成果

Adaptation is an absolute in meeting the challenges of climate change. As identified in the Intergovernmental Panel on Climate Change (IPCC) Special Report on Global Warming of 1.5 degrees (2018), in order to meet the challenges posed by climate change and increase resilience, adaptation that builds on societal values, takes into consideration differing circumstances and socio-cultural contexts, and is place and context specific, is critical. Towards developing adaptation policies that enhance adaptive capacities of small-scale fisheries communities where women are resource managers, not only in Japan but in other countries – more specifically in small island developing states (SIDS) where women resource managers have been identified amongst the most vulnerable and thus deserving of

attention, this research posits that increasing on the ground comprehensive understanding of local communities, developing fisher ecological knowledge (FEK) data set portfolios for communities where adaptive capacity potentials and limitations are identified, could reduce climate-related risks and vulnerabilities, enhance resource management, thus contributing to more integrative holistic approaches to adaptation policy.

Adaptive capacity potentials identified in previous *ama* diver study (2012-15) were explored and confirmed in all 7 prefectures covered in this study. These include proximity to and level of connection with the ocean, space-defined perception of resource availability, and gender and cultural identity as levers in resource management. Of these, proximity to the marine environment has the most potential for place-specific adaptation capacity inputs and contributing to adaptation policy design and implementation. Because *ama* divers are submerged below the ocean surface for the duration of their harvesting activities, they have a heightened awareness, if not sensitivity to the changes in the marine environment and the resources they harvest. This capacity potential is enhanced by cultural identity as there is a hereditary responsibility consciousness to carry on the traditions of their ancestors are passed on to the next generation and that by doing so ensures the ecological health and sustainability of fishing grounds.

Towards building adaptive capacities in fisheries, the UN Food and Agricultural Organization (FAO) has identified 17 common adaptation activities. Building on the *ama* diver study (2012-15) by adding 6 prefectures to the Ishikawa *ama* divers, *ama* diver interviewees from all 7 prefectures confirmed 11 out of the 17 identified by FAO. In the previous study of one *ama* diver community (in Ishikawa), 4 of the 11 were perceived as activities in place and effective, 3 were perceived as activities with limited efficacy, and the remaining 4 were considered non-existent though necessary, but beyond the capacities of the community to initiate.

This study's responses were slightly different, specifically, 2 out of the 11 were perceived as activities in place and effective, 7 were perceived as activities with limited efficacy, and the remaining 2 were deemed necessary though non-existent. The increase in adaptation activities with limited efficacy related responses, this study posits, is perhaps connected to observed increased changes in the marine environment and how this is perceived as impacting marine resources such as abalone, turban shell – in the case of Ishikawa, hijiki in the case of Toba, Mie Prefecture. Below is a brief description of the 11 adaptation activities identified:

Effective/functional adaptation activities:

i) identify and protect valuable areas: eco-mapping based interviews elicited that activities such as no-take zones (NTZ) and seedling release have been conducted in all 7 communities for more than 5 decades, with 4 since the late-19th century. There were concerns voiced among 40% of interviewees about the efficacy of NTZ with respect to seedling release growth rates the need for scientific guidance on ecological-relevance of NTZs.

ii) identification of useful information: employing social media modes such as WhatsApp and Line, communication among *ama* divers, both within and between *ama* diver communities has resulted in access to more information and more importantly perhaps, the discussion about perceived environmental changes and the impacts on marine resources. Although men are more active in the public sphere than women and thus have access to more information, there is an observable trend among women ages 50 and below who are

Adaptation activities with limited efficacy:

i) learning from the past: in previous study of one community 90% of those interviewed stated that to some degree much can be learned from the past. The remaining 10% were *ama* divers below mid-30s whose inexperience perhaps led to a non-committed answer of 'not sure'. In this study, 60% of those interviewed said that although they believe in the value of lessons learned from the past with regard to harvesting techniques, the speed of change and how it is impacting the marine environment (i.e. degradation of seaweed beds critical as spawning grounds and target species' habitats) have resulted in uncertainty of transmitted knowledge sets with regard to their relevance and reliability.

ii) policy and management considerations: intangible heritage designation of the *ama* divers in Mie and Ishikawa prefecture have resulted in concerted efforts by local government fisheries offices and fisheries cooperatives to identify challenges faced by the *ama* divers. Examples of government and community-led initiatives include increasing the size of abalone and turban shell sizes before releasing into NTZ. Although this costs more, the growth rate potentials are better and thus communities such as Toba, Mie prefecture have decided that investment into future harvest potentials is critical. There is potential for the efficacy on these types of interventions and initiatives to grow.

iii) capacity building: 80% of *ama* interviewed believe capacities to understand climate change impacts on their harvesting grounds is needed and that multi-stakeholder partnerships are also critical. This is an increase of 30% since the 2012-15 study. One plausible reason is that discussions among *ama* diver communities (be this through social media or participation at symposiums such as the annual Ama Summit where *ama* divers from Japan and Korea meet and share experiences over 2 days) has increased, thus contributing to the sense of urgency related to supplementing their experiential and observational knowledge gaps with scientific knowledge set.

iv) monitoring: 90% of the *ama* divers interviewed expressed a concern about monitoring needs beyond their capacity, and the need to integrate FEK with CSK. Although seaweed experts advice has been sought in some communities, interaction and feedback are limited among individual *ama* divers and scientists is limited.

v) reduce external stressors on natural systems: place dependent responses. For those communities close to larger urban settlements and/or industrial activities, there seems to be a higher degree of awareness and concern related to human activities that may act as external stressors. For example, Tsushima and Hegura Island respondents voiced limited concerns compared to interviewees close to Toba City.

vi) promote disaster risk management: place dependent responses. On the Japan Sea side, particularly Ishikawa, Fukui and Nagasaki, there was concern voiced over the impact of 'hard options' such as seawalls, believed to potentially change ocean currents and degrade harvesting grounds. However, Mie prefecture few voiced such concerns.

vii) recognition of opportunities: value-added activities such as providing salted fresh *wakame* seaweed, attaining patents for 'hand harvested abalone' to meet consumer preferences exhibits an ability to explore new opportunities. Recently there have been discussions among *ama* diver communities and their respective fisheries cooperatives and local government fisheries offices to explore branding opportunities such as Marine Stewardship Certificate (MSC) eco-labelling.

Non-existent adaptation activities/in need of:

i) international trade: decreasing prices of marine products is seen as critical challenge to socio-economic conditions. Compounded by ageing and depopulation in fishing communities, this is seen as a challenge beyond the capacities of the community requiring national government intervention.

ii) mainstreaming: 80% of *ama* divers interviewed see women in fisheries marginalized. Interviewees also expressed the need to integrate small-scale fisheries into climate change adaptation and food security policies. Many interviewees also commented on the of lack of coordination among government offices, specifically among environmental, fisheries and health and welfare government offices.

Although the FEK data sets possessed by *ama* divers could be useful in policy discussions there still appears to be limited efforts on the side of policy developers to gather and/or refer to these knowledge sets. That said, efforts in regions such as Mie and Ishikawa have increased since 2015, facilitated perhaps by the intangible heritage designation. Further, taking action on discussions of the importance of integrating FEK into policy appears to be limited. Perhaps it is the bias of this researcher, however, based on interviews with policy officials, FEK sets are often perceived as not as reliable as conventional scientific knowledge (CSK) and thus not effectively brought into the policy development process. Beyond the narrow focus of building adaptive capacities in fisheries, *ama* diver FEK could contribute to building narratives of climate change to enhance climate literacy and encourage action not only among fisher communities but civil society and in doing so encourage wider participation, learning and empowering forms of change needed to facilitate and build adaptive capacities and community resilience initiatives.

5 . 主な発表論文等

[学会発表] (計 5 件)

Anne McDonald, The Japanese Society of Fisheries Engineering, paper title: Lessons from the past: a look at climate change and global trends through the lens of environmental history; April 2019

Anne McDonald, The 1st International Conference on Small Island States (SIS) and Subnational Island Jurisdictions (SNJs), paper title: Turning up the volume on 'island her-stories': exploring gender mainstreaming potentials in resource management and climate policies in small islands; March 2019

Anne McDonald, Jeju Island Sustainability Studies International Forum, paper title: Japan's *Ama* Divers' FEK and Cultural Identity in Resource Management; October 2017

Anne McDonald, UNESCO and Secretariat of the Convention on Biological Diversity Biocultural Diversity Meetings and UN Forum for Indigenous People's Rights, talk title: Cultural Identity as a Leverage in Resource Management: Insights from Japan's *Ama* Divers; April 2017

Anne McDonald, 4th International Marine Conservation Congress, paper title: What if women had a seat on the marine policy boat? Gender, cultural identity and one country's efforts to achieve Aichi Biodiversity Targets 6 +11; July 2016

6 . 研究組織

(1)研究分担者

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